

REMARKS

Applicant respectfully requests reconsideration of the present application in view of the foregoing amendments and in view of the reasons that follow.

Claims 1, 2, 5 and 7 are currently being amended.

This amendment changes claims in this application. A detailed listing of all claims that are, or were, in the application, irrespective of whether the claim(s) remain under examination in the application, is presented, with an appropriate defined status identifier.

After amending the claims as set forth above, claims 1-9 are now pending in this application.

Objections to the Specification

The Office Action stated that a substitute specification is required. In response, a marked up copy of the Substitute Specification begins on page 4 of this Amendment and Reply. In addition, a clean version of the Substitute Specification is enclosed. The Substitute Specification contains no new matter. The Examiner is authorized to cancel the specification as filed in favor of the attached Substitute Specification.

Claim Objections

Claims 1 and 2 were objected to for including the phrase “the control unit is modulated.” In response, Applicant has amended claims 1 and 2 to replace the phrase “the control unit is modulated” with “the control unit generates a pulse-width modulation signal,” as suggested by the Examiner. Accordingly, Applicant respectfully requests that the objection be withdrawn.

Claim Rejections under 35 U.S.C. § 102

On page 3 of the Office Action, the Examiner rejected Claims 1-5 and 7-9 under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 6,518,764 titled “Relay Driving Apparatus” issued on February 11, 2003 to Shirato (“Shirato”).

The Examiner stated that:

Shirato discloses relay driving apparatus; the apparatus (fig. 6) comprises: a power supply adapting module for adapting a power supply of a relay. The power supply adapting module is interpreted as a PWM controller which according to Shirato is pulse duration generator according to a value of voltage supply (col. 13, lines 25-43). A control unit (31) configured to control an electromagnetic relay (SW, RL1), the control unit generates a the pulse-width modulation (PWM) signal according to a voltage supply; at least one contact (15, 16), controlled by the control unit, the control unit is configured to control the at least one contact according to the voltage supply (col. 11, lines 21-40); the control unit is configured to provide a contacting voltage to the relay, the contacting voltage ("movable time" in Fig. 7A) is sufficient to close the at least one contact; the control unit is configured to provide according to a voltage supply, a maintaining voltage ("A/B" slots in fig. 7A) sufficient to maintain closure of the at least one contact (fig. 7A) and the control unit (31) is configured to control the power supply adapting module. An oscillator generating pulses is inherent in Shirato's control unit since Shirato's control unit generates a PWM signal to control a transistor (Q5), the oscillator generated pulses (PWM signal) provides the contacting voltage and the maintaining voltage. The control unit generates the contacting voltage such that the duration of the contacting voltage is long enough to move armature of the relay and stay in contact stage and also provides the maintaining voltage such that on/off the durations of the maintaining voltage are long enough to keep armature in contact (on state) (col. 11, lines 33-46).

Shirato does not identically disclose the combination of elements recited in independent Claims 1, 2 and 7 as amended. Shirato is directed to a "Relay Driving Apparatus" including a controller that "supplies the base of the transistor Q5 with a pulse signal S80 which has been subjected to predetermined pulse width modulation thereby controlling the transistor to carry out the on-operation (supplying the rated voltage to the relay coil RL1) or the off-operation (intercepting the supply of the rated voltage to the relay coil RL1)." See Shirato at Col. 11, lines 14-20; and Figure 6.

Claim 1 as amended is in independent form and recites an "electromagnetic relay" comprising, in combination with other elements, a "control unit having a calculator for changing a cyclic ratio value of a pulse duration modulator for supplying a contacting voltage or a maintaining voltage."

Claim 2 as amended is in independent form and recites a "control unit for an electromagnetic relay coupled to a voltage source" comprising, in combination with other

elements, a “power supply-adapting module for adapting the power supply of the relay, the power supply-adapting module having a calculator for changing a cyclic ratio value of a pulse duration modulator for supplying a contacting voltage or a maintaining voltage.” Claims 3-6 depend from independent Claim 2.

Claim 7 is in independent form and recites an “electronic circuit” comprising, in combination with other elements, a “calculator for changing a cyclic ratio value of the at least one pulse duration modulator for supplying a contacting voltage or a maintaining voltage.” Claims 8 and 9 depend from independent Claim 7.

Shirato does not identically disclose an “electromagnetic relay” comprising, in combination with other elements, a “control unit having a calculator for changing a cyclic ratio value of a pulse duration modulator for supplying a contacting voltage or a maintaining voltage” (Claim 1) or a “control unit for an electromagnetic relay coupled to a voltage source” comprising, in combination with other elements, a “power supply-adapting module for adapting the power supply of the relay, the power supply-adapting module having a calculator for changing a cyclic ratio value of a pulse duration modulator for supplying a contacting voltage or a maintaining voltage” (Claim 2) or an “electronic circuit” comprising, in combination with other elements, a “calculator for changing a cyclic ratio value of the at least one pulse duration modulator for supplying a contacting voltage or a maintaining voltage” (Claim 7).

Shirato discloses “the controller 31 supplies the pulse signal S80 to the base of the transistor Q5 to supply the relay coil RL1 with the rated current with which the movable iron piece 15 is moved and attached to the iron core 16, and then supplies the relay coil RL1 with the holding current to keep the attachment state after the movable iron piece 15 is attached to the iron core 16.” *See* Shirato at Col. 11, lines 59-65. However, Shirato does not disclose supplying a contacting voltage or a maintaining voltage by changing a cyclic ratio value of a pulse duration modulator. Instead, to supply a rated current, Shirato sets the pulse signal S80 to periodically have a logical level of “Hi” and to supply a holding current, Shirato sets the pulse signal S80 to alternately switch its logic level between “Hi” and “Lo.” *See* Shirato Col. 11, lines 47-56.

Accordingly, the rejection of Claims 1, 2 and 7 over Shirato is improper. Thus, independent Claims 1, 2 and 7 are patentable over Shirato.

Dependent Claims 3-6, 8 and 9, which depend from one of independent Claims 1, 2 or 7 are also patentable. See 35 U.S.C. § 112 ¶ 4.

The Applicants respectfully request withdrawal of the rejection of Claims 1-5 and 7-9 under 35 U.S.C. § 102(b).

Claim Rejections - 35 U.S.C. § 103(a)

On page 5 of the Office Action, the Examiner rejected Claim 6 as being unpatentable over Shirato in view of U.S. Patent No. 6,493,204 titled "Modulated Voltage for a Solenoid Valve" to Glidden ("Glidden") under 35 U.S.C. § 103(a).

Claim 6, which depends from independent Claim 2, is patentable over Shirato for at least the reason stated above in regard to Claim 2. Glidden does not cure the deficiencies of Shirato. Further, Claim 6 is directed to "a memory configured to store characteristics of the relay." Glidden does not identically disclose "a memory configured to store characteristics of the relay." Instead, Glidden discloses a memory which stores an ABS algorithm. See Glidden at Col. 1, lines 44-45. The ABS control algorithm comprises a set of instructions for a microprocessor which controls the operation of the ABS. See Glidden at Col. 1, lines 46-48. Thus, Glidden does not disclose "a memory configured to store characteristics of the relay" as claimed in Claim 6. Accordingly, Applicant respectfully request withdrawal of the rejection of Claim 6 under 35 U.S.C. § 103(a).

* * *

It is submitted that each outstanding objection and rejection to the Application has been overcome, and that the Application is in a condition for allowance. The Applicants request consideration and allowance of all pending Claims 1-9.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present application.

The Commissioner is hereby authorized to charge any additional fees which may be required regarding this application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 19-0741. Should no proper payment be enclosed herewith, as by a

check or credit card payment form being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 19-0741. If any extensions of time are needed for timely acceptance of papers submitted herewith, Applicant hereby petitions for such extension under 37 C.F.R. § 1.136 and authorizes payment of any such extensions fees to Deposit Account No. 19-0741.

Respectfully submitted,

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